

# Configurable, Multi-Beam, Doppler Ladar Based Precision Landing Sensor, Phase I

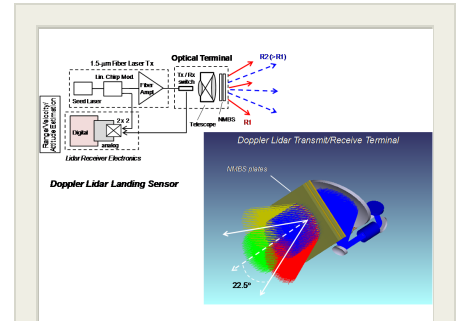
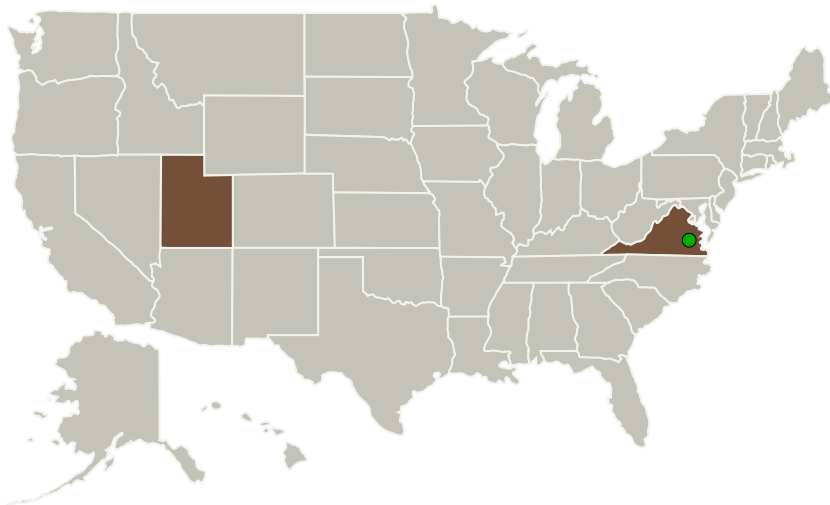
Completed Technology Project (2015 - 2016)



## Project Introduction

Fibertek proposes a configurable, multi-beam, 1.5  $\mu\text{m}$  Doppler Lidar sensor, enabled by high-speed non-mechanical beam steering (NMBS). NMBS uses state-of-the-art, high-speed liquid-crystal based components, to provide wide-angle (up to  $\pm 45$  degree), large-aperture, optical beam steering, at speeds of up to 10 kHz. Furthermore, this is integrated into a very compact optical transmit/receive terminal, designed for coherent lidar operation. The proposed Doppler Lidar sensor is estimated to be 4X lower SWaP, and have 3X-5X improved range performance over the current design for entry, descent, landing (EDL) sensors under development at NASA. In addition, the configurable, high-speed, beam-scan pattern provides enhanced functionality for velocity/range/attitude estimate, and even for terrain mapping. The Doppler Lidar landing sensor model will be developed by our Research Institution partner, leveraging their related work on 3D-imaging lidar. The proposed effort targets a space-qualifiable roadmap, as we will leverage ongoing inter-disciplinary engineering development and qualification at Fibertek, for high-reliability, high-power, fiber laser transmitter and transmit/receive optical terminal for deep-space mission.

## Primary U.S. Work Locations and Key Partners



Configurable, Multi-Beam, Doppler Ladar Based Precision Landing Sensor, Phase I Briefing Chart Image

## Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Images	3
Technology Areas	3
Target Destinations	3

## Configurable, Multi-Beam, Doppler Ladar Based Precision Landing Sensor, Phase I

Completed Technology Project (2015 - 2016)



Organizations Performing Work	Role	Type	Location
Fibertek, Inc.	Lead Organization	Industry	Herndon, Virginia
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia
Utah State University(USU)	Supporting Organization	Academia Alaska Native and Native Hawaiian Serving Institutions (ANNH)	Logan, Utah

## Primary U.S. Work Locations

Utah	Virginia
------	----------

## Project Transitions

▶ **June 2015:** Project Start

✓ **June 2016:** Closed out

## Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138897>)

## Organizational Responsibility

## Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

## Lead Organization:

Fibertek, Inc.

## Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

## Program Director:

Jason L Kessler

## Program Manager:

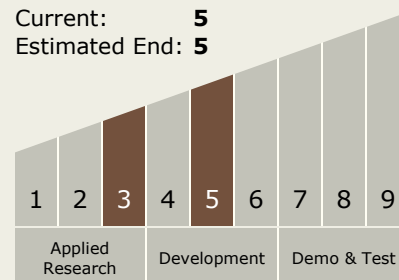
Carlos Torrez

## Principal Investigator:

Shantanu Gupta

## Technology Maturity (TRL)

Start: 3  
Current: 5  
Estimated End: 5



## Completed Technology Project (2015 - 2016)

Earth, The Moon, Others Inside  
the Solar System, Outside the  
Solar System, The Sun, Mars